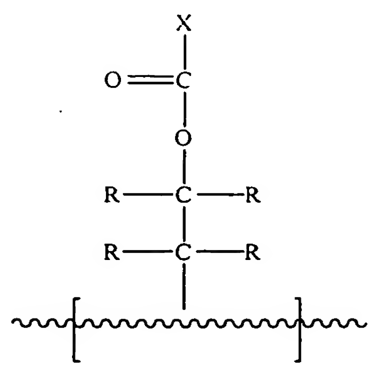
I Claim:

1. A polymer comprising recurring monomers having the formula



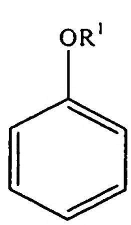
wherein:

each R is individually selected from the group consisting of -OH, -H, and alkyl groups; and

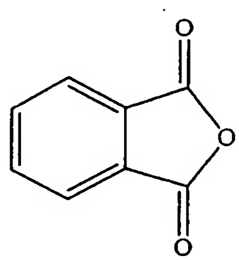
X is an aromatic or heterocyclic light-absorbing moiety and if none of R is -OH, then X includes an -OH.

2. The polymer of claim 1, wherein X includes an aromatic portion selected from the group consisting of thiophenes, naphthoic acid, anthracene, naphthalene, benzene, chalcone, phthalimides, pamoic acid, acridine, azo compounds, dibenzofuran, and derivatives thereof.

3. The polymer of claim 2, wherein X has a formula selected from the group consisting of



and



where R^1 is selected from the group consisting of -H and alkyl groups.

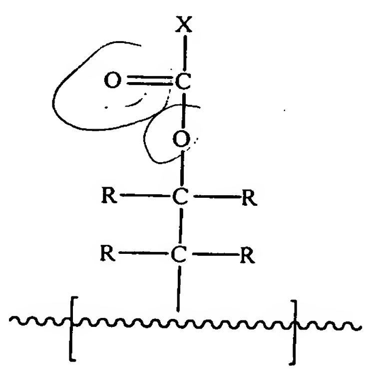
4. The polymer of claim 1, wherein

is selected from the group consisting of acrylics, polyesters, epoxy novolacs, polysaccharides, polyethers, polyimides, and mixtures thereof.

5. The polymer of claim 1, wherein said polymer has an average molecular weight of from about 3,000-60,000 Daltons.

6. The polymer of claim 1, wherein X is present in said polymer at a level of from about 10-60% by weight, based upon the total weight of the polymer taken as 100% by weight.

7. In an anti-reflective composition comprising a polymer dispersed in a solvent system, the improvement being that said polymer comprises recurring monomers according to the formula



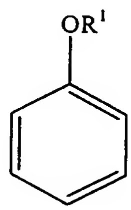
wherein:

each R is individually selected from the group consisting of -OH, -H, and alkyl groups; and

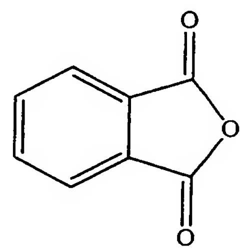
X is an aromatic or heterocyclic light-absorbing moiety and if none of R is -OH, then X includes an -OH.

8. The composition of claim 7, wherein X includes an aromatic portion selected from the group consisting of thiophenes, naphthoic acid, anthracene, naphthalene, benzene, chalcone, phthalimides, pamoic acid, acridine, azo compounds, dibenzofuran, and derivatives thereof.

9. The composition of claim 8, wherein X has a formula selected from the group consisting of



and



where R^1 is selected from the group consisting of -H and alkyl groups.

10. The composition of claim 7, wherein

is selected from the group consisting of acrylics, polyesters, epoxy novolacs, polysaccharides, polyethers, polyimides, and mixtures thereof.

11. The composition of claim 7, wherein said polymer has an average molecular weight of from about 3,000-60,000 Daltons.

12. The composition of claim 7, wherein X is present in said polymer at a level of from about 10-60% by weight, based upon the total weight of the polymer taken as 100% by weight.

13. The composition of claim 7, wherein said composition further comprises a compound selected from the group consisting of crosslinking agents, catalysts, and mixtures thereof.

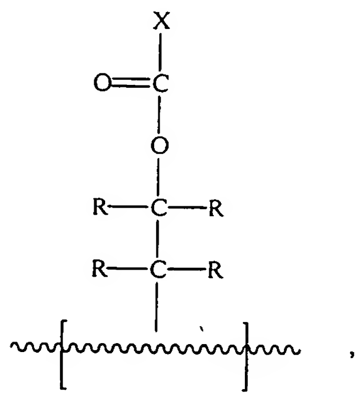
14. The composition of claim 13, wherein said compound is a crosslinking agent selected from the group consisting of aminoplasts, epoxies, polyols, anhydrides, glycidyl ethers, vinyl ethers, and mixtures thereof.

15. The composition of claim 14, wherein said crosslinking agent is selected from the group consisting of glycourils, melamines, trimethylolpropane trivinylether, and trimethylolpropane triglycidylether.

16. The composition of claim 13, wherein said compound is a catalyst selected from the group consisting of *p*-toluenesulfonic acid, Bisphenol S, and mixtures thereof.

17. The composition of claim 7, wherein said solvent system includes a solvent selected from the group consisting of propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, ethyl lactate, cyclohexanone, and mixtures thereof.

18. A cured anti-reflective layer comprising a crosslinked polymer including recurring monomers having a formula



wherein:

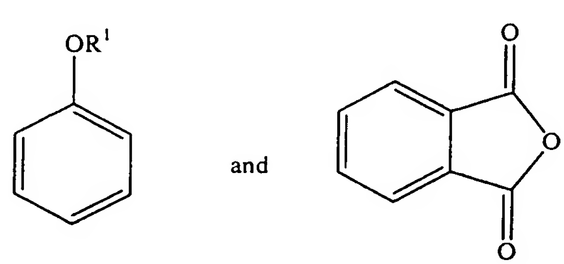
each R is individually selected from the group consisting of -OH, -H, and alkyl groups;

X is an aromatic or heterocyclic light-absorbing moiety; and

at least one of X or R is, or comprises, an $-OR^2$ group, where R^2 is a crosslinking group.

19. The layer of 18, wherein X includes an aromatic portion selected from the group consisting of thiophenes, naphthoic acid, anthracene, naphthalene, benzene, chalcone, phthalimides, pamoic acid, acridine, azo compounds, dibenzofuran, and derivatives thereof.

20. The layer of claim 19, wherein X has a formula selected from the group consisting of



where R^1 is selected from the group consisting of -H and alkyl groups.

21. The layer of claim 18, wherein

is selected from the group consisting of acrylics, polyesters, epoxy novolacs, polysaccharides, polyethers, polyimides, and mixtures thereof.

22. The layer of claim 18, wherein said polymer has an average molecular weight of from about 3,000-60,000 Daltons.

23. The layer of claim 18, wherein X is present in said polymer at a level of from about 10-60% by weight, based upon the total weight of the polymer taken as 100% by weight.

24. The layer of claim 18, wherein said layer is adjacent a substrate.

25. The layer of claim 24, wherein said substrate is selected from the group consisting of Si, Al, W, WSi, GaAs, SiGe, Ta, and TaN wafers.

26. The layer of claim 24, wherein R^2 is selected from the group consisting of moieties of glycourils, melamines, trimethylolpropane trivinylether, and trimethylolpropane triglycidylether.

27. A method of using an anti-reflective composition, said method comprising the step of applying a quantity of the composition according to claim 7 to a substrate to form a layer thereon.

28. The method of claim 27, wherein said applying step comprises spin-coating said composition onto said substrate surface.

29. The method of claim 27, wherein said substrate has a hole formed therein, said hole being defined by a bottom wall and sidewalls, and said applying step comprises applying said composition to at least a portion of said bottom wall and sidewalls.

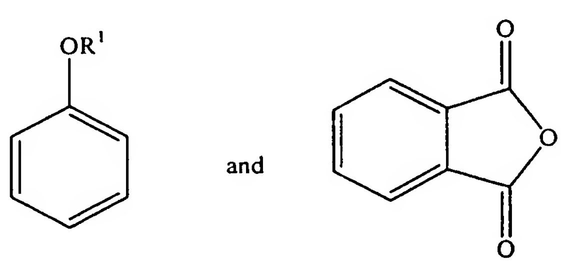
30. The method of claim 27, further including the step of baking said layer, after said applying step, at a temperature of from about 115-205°C to yield a cured layer.

31. The method of claim 30, further including the step of applying a photoresist to said baked layer.

32. The method of claim 31, furthering including the steps of:
exposing at least a portion of said photoresist to activating radiation;
developing said exposed photoresist; and
etching said developed photoresist.

33. The method of claim 27, wherein X includes an aromatic portion selected from the group consisting of thiophenes, naphthoic acid, anthracene, naphthalene, benzene, chalcone, phthalimides, pamoic acid, acridine, azo compounds, dibenzofuran, and derivatives thereof.

34. The method of claim 33, wherein X has a formula selected from the group consisting of



where R^1 is selected from the group consisting of -H and alkyl groups.

35. The method of claim 27, wherein

is selected from the group consisting of acrylics, polyesters, epoxy novolacs, polysaccharides, polyethers, polyimides, and mixtures thereof.

36. The method of claim 27, wherein X is present in said polymer at a level of from about 10-60% by weight, based upon the total weight of the polymer taken as 100% by weight.

37. The combination of:

a substrate having a surface;

a cured anti-reflective layer adjacent said substrate surface, said anti-reflective layer being formed from a composition comprising a polymer and a vinyl ether crosslinking agent dispersed in a solvent system; and

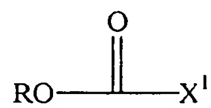
a photoresist layer adjacent said anti-reflective coating composition layer.

38. The combination of claim 37, wherein said crosslinking agent is trimethylolpropane trivinylether.

39. A method of forming a final polymer, said method comprising the step of reacting a starting polymer with a chromophore, wherein:

said starting polymer includes recurring monomers comprising epoxide rings;

said chromophore has the formula



,

where R is selected from the group consisting of -H and alkyl groups and X^1 is an aromatic or heterocyclic light-absorbing moiety; and

during said reacting step, said epoxide ring opens and said chromophore bonds with the opened ring.

40. The method of claim 39, wherein said reacting step is carried out in the presence of a catalyst.

41. The method of claim 39, wherein said reacting step is carried out at a temperature of from about 100-200°C.

42. The method of claim 39, wherein said starting polymer comprises from about 20-80% by weight epoxide rings, based upon the total weight of the starting polymer taken as 100% by weight.

43. The method of claim 39, wherein the molar ratio of starting polymer to chromophore is from about 1:0.5 to about 1:1.

44. The method of claim 39, wherein said chromophore is selected from the group consisting of trimellitic anhydride, 4-hydroxybenzoic acid.